UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

Midas Green Technologies, LLC,	
Plaintiff,	Civil Action No. 6:24-cv-00166-ADA
- vs. -	**Jury Trial Demanded**
Green Revolution Cooling, Inc.	
Defendant	

DECLARATION OF JAMES LEE, Ph.D.
IN SUPPORT OF MIDAS GREEN TECHNOLOGIES, LLC'S
RESPONSIVE CLAIM CONSTRUCTION BRIEF

I. INTRODUCTION

My name is James Lee, Ph.D. and I reside in Pittsford, New York. I am over the age of 18 and am competent to make this declaration in support of Plaintiff's Claim Construction concerning U.S. Patent No. 10, 405, 457 (the "declaration"). I have personal knowledge or have developed knowledge based upon education, training, or experience of the matters set forth herein.

I have been retained by Plaintiff Midas Green Technologies, LLC ("Midas") in the above-captioned proceeding as an independent consultant to offer opinions and testimony to support the Plaintiff's Claim Construction of U.S. Patent No. 10,405,457 (the "'457 Patent" or "Patent-in-Suit") attached hereto as **Exhibit 1.**

I understand that Midas is alleging infringement of the '457 Patent against Defendants Green Revolution Cooling Inc. ("GRC") in the above-captioned matter in the Western District of Texas, Waco Division.

II. BACKGROUND AND QUALIFICATIONS

I am a licensed Professional Engineer with a Ph.D. in Mechanical Engineering from Texas A&M University. Before obtaining my Ph.D., I received a Bachelor of Science in Aeronautical Engineering from California Polytechnic State University, San Luis Obispo, CA.

My areas of expertise include fluid dynamics, heat transfer, mechanical systems, and component design; energy systems involving engines and renewable energy.

Currently, I am an Associate Professor at the Rochester Institute of Technology, located in Rochester, New York. I am the chair of the Electrical and Computer Engineering Technology Department. I currently perform research on internal combustion engine development, alternative energy systems development, and new technology assessment.

Prior to my time at the Rochester Institute of Technology, I was a Senior Research Associate at General Motors where I designed and analyzed cooling systems for fuel cell systems. I was also the program manager responsible for developing materials and processes that enable high-volume manufacturing of membrane electrode assemblies, the heart of a fuel cell. During my tenure at General Motors, I was awarded the Chairman's Award for outstanding innovation in the automotive industry.

I have attached my complete and accurate Curriculum Vitae as **Exhibit 2** to this Declaration.

I am being compensated for my services in this matter at my standard consulting rate of $450 per hour. I am also being reimbursed for expenses that I incur during the course of this work. My compensation is not contingent upon the results of my study, the substance of my opinions, or the outcome of any proceeding involving the '457 Patent and the Asserted Claims. I have no financial interest in the outcome of this matter.

I am prepared to testify as an expert witness for deposition and at trial in this matter if called to do so.

III. MATERIALS CONSIDERED

The materials I have considered in rendering my opinions are listed in **Exhibit 3.**

IV. LEGAL GUIDELINES

A. Level of Ordinary Skill in the Art

I understand that claims are viewed from the perspective of a person of ordinary skill in the art (POSITA). I understand that a POSITA is a hypothetical person who is presumed to have known the relevant art at the time of the invention. Factors that may be considered in determining the level of ordinary skill in the art may include: (1) type of problems encountered in the art; (2) prior art solutions to those problems; (3) rapidity with which innovations are made; (4) sophistication of the technology; and (5) educational level of active workers in the field, including the inventors. I have also been informed that in some cases, every factor may not be accounted for, and the factors may have various weights applied to them.

B. 35 USC §112 Indefiniteness

"[I]ndefiniteness is a question of law and in effect part of claim construction." *ePlus, Inc. v. Lawson Software, Inc.* 700 F.3d 509, 517 (Fed. Cir. 2012); *Eidos Display, LLC v. AU Optronics Corp.*, 779 F.3d 1360, 1364-65 (Fed. Cir. 2015) ("The indefiniteness inquiry here is intertwined with claim construction . . ."). Pre-AIA 35 U.S.C. § 112, ¶ 2[1] requires that a patent's specification "conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention." *Id.* In other words, a claim must inform a person of skill in the art as to what is within its scope and what is excluded. *Exmark Mfg. Co., Inc. v. Briggs & Stratton Power Prods. Grp., LLC*, 879 F.3d 1332, 1346 (Fed. Cir. 2018). Because all

patents are presumed valid, invalidity for indefiniteness must be proven by clear and convincing evidence.

The definiteness requirement thus contains two requirements: "first, [the claim] must set forth what 'the applicant regards as his invention,' and second, it must do so with sufficient particularity and distinctness, i.e., the claim must be sufficiently 'definite.' " *Allen Eng'g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1348 (Fed. Cir. 2002). A claim is invalid under the first requirement "[w]here it would be apparent to one of skill in the art, based on the specification, that the invention set forth in a claim is not what the patentee regarded as his invention." *Id.* at 1349. It is of no significance whether the contradiction between the specification and the claim is obvious; "[i]t is not [a court's] function to rewrite claims to preserve their validity." *Id.* (citing *In re Hammack*, 427 F.2d 1384, 1388, n.5 (CCPA 1970); *Rhine v. Casio, Inc.*, 183 F.3d 1342, 1345 (Fed. Cir. 1999)); *see also*, *Juxtacomm-Texas Software, LLC v. Axway, Inc.*, 2012 WL 7637197, *5 (E.D. Tex. July 5, 2012) (held claims that contradicted the teachings of the specification were invalid under § 112, ¶ 2).

A claim is indefinite under the second requirement if, when "read in light of the specification" and "prosecution history," it "fail[s] to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014). Absolute precision is not required; however, a claim must provide objective boundaries with sufficient clarity "such that a person of ordinary skill in the art could determine whether or not an accused product or method infringes the claim." *Niazi Licensing Corp. v. St. Jude Med. S.C., Inc.*, 30 F.4th 1339, 1346-1347 (Fed. Cir. 2022) (citing *Nautilus*, 572 U.S. at 910; *Guangdong Alison Hi-Tech Co. v. Int'l Trade Comm'n*, 936 F.3d 1353, 1359 (Fed. Cir. 2019)). "As with any question of claim construction, the intrinsic record—the patent's claims,

written description, and prosecution history, along with any relevant extrinsic evidence can provide or help identify the necessary objective boundaries for claim scope." *Niazi Licensing*, 30 F.4th at 1349, (citing *Guangdong*, 936 F.3d at 1360).

"Reasonable certainty" must be evaluated in view of the claims as a whole, not "particular claim terms." *Cox Commc'ns, Inc. v. Sprint Commc'n Co. LP*, 838 F.3d 1224, 1231 (Fed. Cir. 2016) (reversing district court and holding that claims were not indefinite). "Reasonable certainty [also] does not require absolute or mathematical prevision." *BASF Corp. v. Johnson Matthey Inc.*, 875 F.3d 1360, 1365 (Fed. Cir. 2017) (quoting *Nautilus*, 783 F.3d at 1381). Indeed, claim language that defines something "by what it does" satisfies the "reasonable certainty" standard where a person of ordinary skill in the art would understand "what compositions perform a particular function." Id. at 1366 (citing *Hill-Rom Servs., Inc. v. Stryker Corp.*, 755 F.3d 1367, 1374–75 (Fed. Cir. 2014). This is because "an inventor need not explain every detail because a patent is read by those of skill in the art. Id. at 1366 (quoting *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1367 (Fed. Cir. 2011)).

A claim is not indefinite because it may be broad. "Merely claiming broadly does not render a claim insolubly ambiguous, nor does it prevent the public from understanding the scope." *Ultimax Cement Mfg. Corp. v. CTS Cement Mfg. Corp.*, 587 F.3d 1339, 1352 (Fed. Cir. 2009). Indeed, "[b]readth is not indefiniteness." *BASF Corp.*, 875 F.3d at 1367 (quoting *SmithKline Beecham Corp. v. Apotex Corp.*, 403 F.3d 1331, 1341 (Fed. Cir. 2005)).

Judge Bryson of the Federal Circuit has summarized the reasonable certainty standard for indefiniteness post-*Nautilus* as follows: "if the court concludes that a person of ordinary skill in the art, with the aid of the specification, would understand what is claimed, the claim is not

indefinite." *Freeny v. Apple Inc.*, No. 2:13–CV–00361–WCB, 2014 U.S. Dist. LEXIS 120446 at *15 (E.D. Tex. Aug. 28, 2014) (Bryson, J., sitting by designation).

V. IMMERSION COOLING GENERALLY

Traditionally, the temperature of operating electrical appliances, e.g. computers and their components, has been maintained by circulating cool air through and around the electrical appliances. Waste energy, typically referred to as heat, from the electrical appliance is transferred from an electrical appliance to the air through convection heat transfer. Defined as the transport of energy to or from a surface by both molecular conduction processes and gross fluid movement (Convective Heat and Mass Transfer, W.M Kays and M.E. Crawford, 3rd ed, 1993), convection heat transfer is quantified using Newton's Law of Cooling.

$$\dot{Q} = hA(T_S - T_f)$$

Where: $\dot{Q}$ - Heat Transfer per unit time [W or BTU/hr]

h - Convection heat transfer coefficient [W/m^2-K or Btu/hr-ft^2-R]

A - Surface area of contact for heat transfer [m^2 or ft^2]

T_S - Surface temperature of the electrical appliance [C or F]

T_f - Bulk temperature of the fluid [C or F]

In order to maintain a consistent temperature, the heat transfer rate per unit time ($\dot{Q}$) should equal the heat generated by the electrical device. As specified in Newton's Law of Cooling, the heat transfer rate from an electrical appliance is dependent on the surface area of contact (A) between the appliance and the fluid, the difference between the temperature of the appliance (T_S) and the bulk or average temperature of the fluid (T_f), and the convective heat transfer coefficient (h).

As the power of electrical appliances has increased, the amount of cooling required to

prevent overheating of the electrical appliances has increased. As indicated by Newton's Law of Cooling, the heat removed from an electrical appliance can be increased by increasing the surface area of the heat transfer, and reducing the bulk temperature of the cooling fluid, and thereby increasing the temperature difference between the electrical appliance and the cooling fluid. However, both of these options have negative effects on system and operating costs. The remaining option is to increase the convective heat transfer coefficient (h).

According to Cengel et al., "The convection heat transfer coefficient h can be defined as the rate of heat transfer between a solid surface and a fluid per unit surface area per unit temperature difference." (Fundamentals of Thermal-Fluid Sciences, Yunus Cengel, John Cimbala, and Robert Turner, 4th ed, 2012) The magnitude of the convective heat transfer coefficient (h) depends on the velocity of the heat transfer fluid, the temperature difference between the electrical appliance and the dielectric cooling fluid, the properties of the fluid, and the shape of the electrical appliance being cooled. Since the shape of the electrical appliance is heavily dependent on the components contained within, and only a minor factor in determining the convection heat transfer coefficient, changing the shape of the electrical appliance for the purposes of increasing the heat transfer is seldom pursued. Alternatively, increasing the amount of waste energy removed from the electrical appliance has focused on the fluid used and the velocity of the fluid.

The simplest form of convection heat transfer utilizes the buoyancy effect of warming fluid. Known as natural convection, this process circulates heat transfer fluid as a result of warm cooling fluid having a lower density and being pushed upwardly by cooler, and higher density, cooling fluid. Convection heat transfer coefficients for natural convection are determined from the properties of the cooling fluid, the temperature difference between the electrical appliance and

bulk cooling fluid, and to a lesser extent the physical shape and orientation of the electrical appliance.

One means of greatly increasing the convection heat transfer coefficient is to use an external device, such as a pump or fan, to increase the flow rate of coolant to be greater than what is possible as a result of density change (natural convection). Increasing the coolant flow through the use of a pump or fan is known as forced convection and refers to the enhancement of heat transfer as a result of fluid motion. (Convective Heat and Mass Transfer, W.M Kays and M.E. Crawford, 3rd ed., 1993). The increased heat transfer of forced convection is captured in Newton's Law of Cooling through an increased convection heat transfer coefficient. This is why facilities that house a large number of electrical appliances, e.g., data centers, have traditionally used fans to force cooled air to circulate around the electrical appliances.

Modifying the fluid used to cool the electrical appliances is another effective means to increase the convection heat transfer available to maintain electrical appliance operating temperatures. Air has traditionally been used as a fluid for cooling electrical appliances due to its ease of use and is non-electrically conductive. Unfortunately, air has a low thermal capacity (ability to carry energy) and low density, and correspondingly a low convection heat transfer coefficient. Replacing air with a fluid that has a high thermal capacity, high density, and is non-electrically conductive, referred to as a dielectric fluid, and designing a system around such a fluid, greatly increases the capacity of a system to maintain the optimal operating temperature of electrical appliances.

The focus of immersion cooling system development, and the subject of the 457 Patent, is the invention of an improved cooling system that maximizes Newton's Law of Cooling to efficiently control the operating temperature of electrical appliances. To accomplish this improved

performance, immersion cooling systems make the most use of the temperature difference between the electrical appliances and the cooling fluid, optimize the use of forced convection, and utilize dielectric coolant with a high thermal capacity, high density, and non-electrically conductive.

A. The '457 Patent

The patent at issue is the '457 Patent issued September 3, 2019. The '457 Patent is assigned to Midas Green Technologies, LLC. The title of the '457 Patent is "Appliance Immersion Cooling System." At a high level, the '457 Patent is directed to a system for improved cooling of electronic devices, such as computer servers and other computing equipment. More particularly, the system of the '457 Patent immerses electronic appliances in a tank of dielectric fluid (in this case, a dielectric liquid). Dielectric fluid is non-electrically conductive, so it is safe for electronics and has desirable thermodynamic characteristics, such that it is able to more efficiently extract heat from electronic devices as compared to air-cooling. The system of the '457 Patent circulates the dielectric fluid in the tank, and in particular, dispenses the fluid into the tank from a plenum adjacent the bottom of the tank, which uniformly directs the fluid upwardly through the electronic appliances. The heated fluid flows out of the cooling tank over a weir, and the fluid is received into a recovery reservoir. The heated dielectric fluid is then circulated through a secondary circulation facility that extracts heat from the dielectric fluid and dissipates the heat to the environment. A control system coordinates the circulations as a function of the temperature of the dielectric fluid.

The focus of immersion cooling system development, and the subject of the '457 Patent, is the invention of an improved cooling system that maximizes Newton's Law of Cooling to efficiently control the operating temperature of electrical appliances. To accomplish this improved performance, the '457 Patent ensures a uniform distribution of cold dielectric coolant and carefully

controls the flow of the cold versus hot coolant. By having a plenum at the bottom of the cooling tank and a weir at the top, the '457 Patent ensures that there is no mixing of hot and cold coolant, therefore maximizing the cooling capacity of the immersion cooling system.

B. Level Of Ordinary Skill

I understand that claims are viewed from the perspective of a person of ordinary skill in the art (POSITA). I understand that a POSITA is a hypothetical person who is presumed to have known the relevant art at the time of the invention. Factors that may be considered in determining the level of ordinary skill in the art may include: (1) type of problems encountered in the art; (2) prior art solutions to those problems; (3) rapidity with which innovations are made; (4) sophistication of the technology; and (5) educational level of active workers in the field, including the inventors. I have also been informed that in some cases, every factor may not be accounted for, and the factors may have various weights applied to them.

Taking these factors into consideration, it is my opinion that a POSITA at the time of the earliest possible priority date of the Patent-In-Suit would have been an individual with a bachelor's degree in science or engineering with at least three years of experience working in a field that involves the operating or maintaining computers in data centers or other environments having large numbers of heat-generating electrical appliances. Additional education could compensate for less practical experience and vice versa.

I understand Dr. Dahm took the position that in the context of the Patent-in-Suit, "a POSITA would have had a Bachelor of Science degree in mechanical or chemical engineering and at least two years of experience relating to the design and/or implementation of fluid circulation systems involving application of fluid dynamics and heat transfer principles. Additional education may serve as a substitute for a lack of experience and vice versa."

I do not agree with Dr. Dahm's definition of POSITA. Still, my opinions are the same regardless of both of these definitions.

C. Disputed Constructions

1. **Weir**

TERM	MIDAS PROPOSAL	GRC PROPOSAL
"weir" (claims 1 & 6)	"an overflow structure or barrier **<u>that a liquid flows over</u>**"	"an overflow structure or barrier **<u>that determines the level of liquid</u>**"

Midas proposes a simple construction for "*weir*" that is consistent and fully supported by claims 1 and 6, by the specification, and by what is understood by a POSITA. For example, the '457 patent expressly states (Fig. 5 also duplicated):

> *One further shared component is the dielectric fluid recovery facility 40 (FIG. 2) comprising a dielectric fluid recovery reservoir 42 (see, FIG. 3, FIG. 4 and FIG. 13) positioned vertically beneath the overflow lip of the weir 22 and adapted smoothly to receive the dielectric fluid as it flows over the weir 22; (4:27-32)*

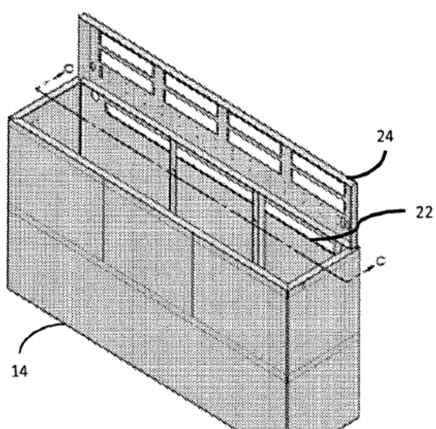

Fig. 5

Further, by definition and as understood by a POSITA, a "weir is a dam over which liquids are forced to flow." (Mark's Standard Handbook for Mechanical Engineers, 10th ed, Avallone,

Eugene A., Baumeister III, Theodore, 1996) As such, a primary function of a weir is to provide a barrier that prevents liquid from flowing when the level of the liquid is below the barrier, called the crest of the weir, and enables liquid to flow once the level of the liquid exceeds the crest. A weir is classified according to the shape of the crest, examples include, but are not limited to, rectangular, triangular, trapezoidal, parabolic, and hyperbolic weirs. The weir featured in Figures 5, 6, and 13 of the '457 Patent is classified as a rectangular weir because the crest, or lip, has a rectangular shape. Different embodiments of the '457 Patent may utilize a crest, or lip, with a different shape.

The crest of a weir does determine the minimum level of liquid required for the fluid to flow over the weir, but the weir alone does not determine the level of liquid in a system containing a weir. The forces acting on a liquid flowing over a weir include inertia, viscosity, surface tension, and gravity. (Mark's Standard Handbook for Mechanical Engineers, 10th ed, Avallone, Eugene A., Baumeister III, Theodore, 1996) These forces and the flow rate of the liquid determine the size of the Head, or distance between the surface of the liquid and the crest, as shown in Figure 1. In turn, the size of the Head, in combination with the forces acting on the liquid and the shape of the crest, determine the size of the Nappe (see Figure 1) which is a measure of the amount of liquid flowing over the weir.

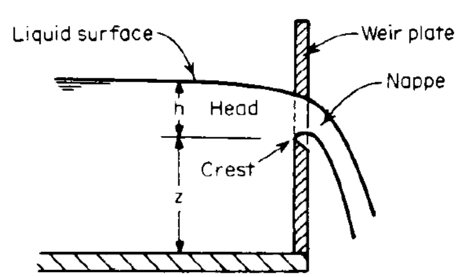

Figure 1: Notation of a Weir (Mark's Standard Handbook for Mechanical Engineers, 10th ed, Avallone, Eugene A., Baumeister III, Theodore, 1996)

As seen in the preceding paragraphs, the multiple forces that act on the liquid, the rate of

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flow of the liquid, and the location and shape of the crest all contribute to determining the level of liquid in a system containing a weir. Further, the level of coolant is being influenced by multiple components of the primary circulation facility as described in the '457 Patent where it states "the primary circulation facility 28 (comprising redundant sub-facilities 28a and 28b) comprises both passive (conduits, couplers, etc.) and active (valves, pumps, sensors, etc.) components" (Col 4 ln 5 - 8) and further describes "One further shared component is the dielectric fluid recovery facility 40 (FIG.2) comprising a dielectric fluid recovery reservoir 42 (see, FIG 3, FIG. 4 and FIG. 13) positioned vertically beneath the overflow lip of the weir 22" (Col 4, ln 27 - 32). A POSITA would understand that the primary circulation facility, which includes multiple active and passive components, would have a significant effect on the level of coolant.

The construction of a weir as "an overflow structure or barrier that a liquid flows over" is a straightforward and consistent construction that is very understandable to a POSITA. Therefore, the construction "an overflow structure or barrier that a liquid flows over" is instructive and understandable to a POSITA and should be adopted.

2. Integrated Horizontally Into the Long Wall of the Tank

TERM	MIDAS PROPOSAL	GRC PROPOSAL
"a weir, **<u>integrated horizontally</u>** into the long wall of the tank (claims 1 & 6)	Plain Meaning	"a weir **<u>having a horizontal (as opposed to vertical) orientation that is integrated</u>** into the long wall of the tank

As defined in a previous section of this declaration, a "weir is a dam over which liquids are forced to flow." A POSITA would understand that a dam and a weir are both structures that utilize gravity to force the liquid to flow over the crest or lip. As such, the horizontal orientation of the crest or lip, no matter what the shape of the lip, e.g. rectangular notch, triangular notch, trapezoidal

notch, etc. is the key to achieving the goal of the claim which is stated to be to "facilitate substantially uniform recovery of the dielectric fluid flowing through each appliance slot."

Adding "(as opposed to vertical)" to the claim language will only add confusion. A POSITA would understand that to orient a weir with even a slight vertical orientation, e.g. a weir with a lip that slopes, will result in a liquid flow rate through appliance slots that varies with location along the long wall of the tank. This is contrary to the goal of the claim to "facilitate substantially uniform recovery of the dielectric fluid flowing through each appliance slot."

The body of the '457 Patent is very clear about the horizontal orientation of the weir. The abstract clearly states "A weir, integrated horizontally into a long wall of the tank, is adapted to facilitate substantially uniform recovery of the dielectric fluid flowing through each appliance slot." A POSITA would understand that only a horizontally oriented weir would result in a substantially uniform recovery of the dielectric coolant. Further, the Detailed Description of the Invention clearly describes the horizontal orientation of the weir, "a weir [22] (best seen in isolation in FIG. 5 and FIG. 6), integrated horizontally into one long wall of the tank [14] adjacent all appliance slots [18], and adapted to facilitate substantially uniform recovery of the dielectric fluid flowing through each of the appliance slots [18];" (Col. 3, lns. 52-56.) Finally, Figures 5 and 6 of the '457 Patent label the weir [22] and clearly show the horizontal orientation. Figure 1 of the '457 Patent shows an isometric view of the Tank Facility [12] and shows the weir with its horizontal orientation. A POSITA would use this ample information to conclude that a horizontal orientation of the weir is required to achieve the goal of substantially uniform recovery of the dielectric fluid flowing through each of the appliance slots. To add "(As opposed to vertical)" to the claim language, a phrase that does not exist anywhere in the '457 Patent or the associated provisional documents would add confusion and not clarity to the claim.

Therefore, it is my opinion that the claim language "a weir, integrated horizontally into the long wall of the tank" should be given its plain meaning without any added words or phrases.

3. Dielectric Fluid Recovery

TERM	MIDAS PROPOSAL	GRC PROPOSAL
"a dielectric fluid recovery reservoir positioned vertically beneath the overflow lip of the weir and adapted to receive the dielectric fluid as it flows over the weir" (claims 1 & 6)	Plain meaning	*"the dielectric fluid is received by the recovery reservoir as soon as the fluid flows over the weir"*

The '457 Patent is quite clear and definitive that the location of the recovery reservoir is located below the lip, or crest, of the weir, e.g. "One further shared component is the dielectric fluid recovery facility 40 (FIG. 2) comprising a dielectric fluid recovery reservoir 42 (see, FIG. 3, FIG. 4, and FIG. 13) positioned vertically beneath the overflow lip of the weir 22 and adapted smoothly to receive the dielectric fluid as it flows over the weir 22;" (Col. 4 lns. 27-32.) A review of FIG. 2, 3, 4, and 13 of the '457 Patent supports the written description by showing the dielectric fluid recovery reservoir located vertically beneath the entirety of the overflow lip of Weir [22].

The concept of the dielectric fluid recovery reservoir being positioned beneath the overflow lip of the weir is also clearly disclosed in the 2012 Provisional on page 35, a reproduction of page 5 of the inventor notebook . The top figure on the page shows a side view of a cooling tank containing "U-shaped drain tubes" which are fluidly connected to a "sump." A cross-section sketch of the U-shaped drain tubes is provided lower on the page. A POSITA would understand that the dielectric fluid would accumulate in the U-shaped drain tubes and then move to the sump utilizing intervening structures, i.e. tubing shown in the sketch.

While the description and claims of the '457 Patent clearly specify that the reservoir must be located below the lip or crest of the weir, there is nothing in either the description or the claims

that precludes the use of intervening structures between the weir and reservoir. The "sump" described in the inventor's notebook, page 35 of the 2012 Provisional, is a dielectric fluid recovery reservoir positioned vertically beneath the overflow lip of the weir and adapted to receive the dielectric fluid as it flows over the weir. The description in the middle of page 35, i.e. "U-Tubes drain into a closed sump container for recirculation through a heat exchanger" is consistent with the description and claims in the '457 Patent.

A POSITA would possess the knowledge of fluid dynamics to understand from the description given in the '457 Patent that the dielectric cooling fluid exiting the weir must be captured in a reservoir and that reservoir must be positioned vertically beneath the crest or lip. A POSITA's knowledge of fluid dynamics would also inform them that this can be accomplished using intervening structures such as piping, fluid collection containers, troughs, etc. As such, it would be clear to a POSITA that the relationship between the recovery reservoir and the dielectric coolant, as it flows over the weir of each of the embodiments described above, satisfies the description and claims of the '457 Patent.

Based on their knowledge of fluid dynamics, and the description given in the '457 Patent, the existing wording of Claims 1 and 6 of "a dielectric fluid recovery reservoir positioned vertically beneath the overflow lip of the weir and adapted to receive the dielectric fluid as it flows over the weir" is complete and clear to a POSITA. Adding the additional wording of "as soon as" would be adding significant restrictions to the '457 Patent that are not intended nor required. The addition of "as soon as" to the claim interpretation would prevent the use of any intervening structures and significantly change the scope of the claim.

Therefore, it is my opinion that the claim language "a dielectric fluid recovery reservoir positioned vertically beneath the overflow lip of the weir and adapted to receive the dielectric fluid

as it flows over the weir" should be given its plain meaning without any added words, phrases, or restrictions that are not intended nor required and thus maintaining the original scope of the '457 Patent.

VIV. Claim 2 is Valid Under 35 USC § 112

Midas proposes that Claim 2 of the '457 Patent should be given its plain meaning while GRC proposes that Claim 2 is indefinite. The basis for GRC's indefinite proposal is that Claim 2 fails to inform, with reasonable certainty, those skilled in the art as to the scope of Claim 2 and in particular the term "highly-integrated." I disagree.

The descriptor "highly" is very well understood in engineering. There are many engineering examples where "highly" is used to describe a material or process which is well understood. Examples of materials include highly viscous fluids, e.g. honey, molasses, highly conductive electrical material, e.g. copper, silver, and highly conductive thermal materials, e.g. diamond, aluminum. Examples of well understood processes that utilize "highly" include a highly efficient process, a highly redundant process, and highly cost-effective processes.

A POSITA with an engineering degree and two years of design experience would understand that the components of a "highly-integrated" primary circulation facility would have physical design requirements such as inlet and outlet restrictions of a pump, heat exchanger, sensors, etc. and that these design requirements need to be honored, but no additional spacing between components is desired. This would be obvious to a POSITA when considering the goals of the '457 Patent including minimizing the volume of dielectric coolant due to cost (Col. 2, lns. 15-20 and Col. 2 lns. 41-46), minimizing dielectric coolant volume (Col. 8, lns. 47-50), the benefits of a highly integrated module (Col. 8, lns. 54-57), the benefits of component placement beyond dielectric coolant reduction (Col. 8, lns. 57-65), and the benefits of compact design (Col. 8, lns. 65

– Col. 9, lns. 1-4.) A POSITA would understand the resulting need to make the circulation system as compact as possible while maintaining component performance.

Therefore, it is my opinion that the claim language "The system of claim 1 wherein the tank and primary circulation facility comprise a highly-integrated module" is well defined and should be given its plain meaning.

D. Response to Declaration of Werner J.A. Dahm, Ph.D. In Support of Defendant's Claim Construction

In his declaration entitled "Declaration of Werner J.A. Dahm, Ph.D. In Support of Defendant's Claim Construction," Dr. Dahm expresses in paragraph 35 that "Heat Transfer is the technical branch of engineering and science that deals with thermal energy transfer by conduction, convection, and radiation, where convection refers to the enhancement of heat transfer that results from fluid motion." I disagree.

While I do agree that "Heat Transfer is the technical branch of engineering and science that deals with thermal energy transfer by conduction, convection, and radiation," the definition of convection heat transfer proposed by Dr. Dahm is confusing and not correct. As I described above in the "Immersion Cooling Generally" section, convection heat transfer is the transport of energy to or from a surface by molecular conduction processes and gross fluid movement. The motion of a fluid does not enhance heat transfer, e.g. conduction or radiation, instead, the energy that moves into the fluid from a surface or from a surface to the fluid, depending on whether the fluid or the surface has a higher temperature, is the convection heat transfer.

The description "enhancement of heat transfer that results from fluid motion" is more commonly used to describe the effect of forced convection as compared to natural convection. Forced Convection is defined by the fluid motion involved in the convection heat transfer process

that is induced by some external means such as a pump or fan. Natural (or free) convection heat transfer is defined by the fluid motion arising from external force fields, such as gravity, acting on density gradients induced by the transport process itself. (Convective Heat and Mass Transfer, W.M Kays and M.E. Crawford, 3rd ed, 1993.) Because convection heat transfer is such an important mechanism of the '457 Patent it is important to adopt a clear and precise definition for the concept.

VI. CONCLUSION

The conclusions that I have drawn concerning the disputed Terms and Phrases are based on my understanding of the background and skills of a POSITA at the priority date of the '457 Patent. A summary of my conclusions is as follows:

The construction of a "weir" in Claims 1 and 6 as "an overflow structure or barrier that a liquid flows over" is more instructive and understandable to a POSITA than the construction proposed by GRC and, therefore, should be adopted.

The construction of Claims 1 and 6 as "a weir, integrated horizontally into the long wall of the tank" should be given its plain meaning without any added words or phrases.

The construction of Claims 1 and 6 as "a dielectric fluid recovery reservoir positioned vertically beneath the overflow lip of the weir and adapted to receive the dielectric fluid as it flows over the weir" should be given its plain meaning so as to maintain the present scope of the claim without any added words, phrases, or restrictions.

The claim language of Claim 2 as "The system of claim 1 wherein the tank and primary circulation facility comprise a highly-integrated module" is well defined and should be given its plain meaning.

I declare under penalty of perjury under the laws of the that the foregoing is true and

correct.

Executed December 16, 2024, at Rochester, New York.

Signed by:
James H. Lee
0E556EE935DF4FF...
James Lee Ph.D.